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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LE, EMILY M	

ART UNIT	PAPER NUMBER
1648	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/666,834	SEGAL ET AL.	
	Examiner	Art Unit	
	Emily Le	1648	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28,30,31 and 33-77* is/are pending in the application.

4a) Of the above claim(s) *34-72* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28, 30-31, 33 and 73-77* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 29 and 32 are cancelled. Claims 1-28, 30-31 and 33-77 are pending. Claims 34-72 are withdrawn from examination because the claims are directed to a non-elected invention. Claims 1-28, 30-31, 33 and 73-77 are under examination.

To allow the entry of the rejection(s) set forth below, this office action is a non-final office action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-9, 11, 21-28, 30-31, 33 and 73-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoo.[1]

The claims are directed to a composition comprising an antigen bearing target comprising at least one of the following: a viral antigen, a bacterial antigen, a fungal antigen, a parasite antigen and a prion antigen; and a fusion polypeptide comprising i) a first amino acid sequence that binds to a carbohydrate; and ii) a second amino acid sequence comprising the sequence of a ligand for a cell surface polypeptide chosen from the group consisting of a ligand for a cytokine receptor, a CD40, an

[1] Hoo, W., U.S. Patent No. 5891432, published April 06, 1999.

adhesion molecule, a defesin receptor, a heat shock protein receptor, a counterreceptor for a T cell costimulatory molecule.

Claim 2, which depends on claim 1, requires the antigen bearing target to be selected from the group consisting of a virus, a bacterial cell, fungal cell, a cell of a parasite, a prion, a mammalian cell, an insect cell, a polypeptide free of other cell-derived material. Claims 3-4, which depend on claim 2, requires the antigen bearing target to be pathogenic and attenuated, respectively. Claim 5, which depends on claim 1, limits the antigen bearing target to a cell that is substantially unable to divide. Claim 6, which depends on claim 2, limits the antigen bearing target to a cell and requires that the fusion polypeptide be exogenous to the cell. Claim 7, which depends on claim 2, limits the antigen bearing target to a cell and requires that the fusion polypeptide be endogenous to the cell, wherein the fusion polypeptide is encoded by a nucleic acid sequence comprised by the cell.

Claims 8-9, which depend on claim 1, require the first amino acid sequence to be N-terminal and C-terminal to the second amino acid sequence, respectively. Claim 11, which depends on claim 1, requires the first amino acid sequence to comprise a carbohydrate-binding domain of a naturally occurring lectin. Claim 21, which depends on claim 1, limits the ligand for a cell surface polypeptide to a ligand for a mammalian cell surface polypeptide. Claims 22-23, which depend on claim 21, limit the mammalian cell surface polypeptide to mouse and human cell surface polypeptide, respectively. Claim 24, which depends on claim 1, limits the ligand for a cell surface polypeptide to a ligand for a cell surface polypeptide of a leukocyte,

which is further limited to dendritic cells by claim 27. Claim 25, which depends on claim 1, limits the ligand for a cell surface polypeptide be a ligand for a cell surface polypeptide of an antigen presenting cell, which is further limited to a professional antigen presenting cell by claim 26. Claims 28 and 30, which depend on claim 1, limit the ligand for a cell surface polypeptide to a ligand for a mouse GM-CSF receptor and to comprise a mouse GM-CSF receptor, respectively. Claims 31 and 33, which depend on claim 1, limit the ligand for a cell surface polypeptide to a ligand for a human GM-CSF receptor and to comprise a human GM-CSF receptor, respectively. Claim 73, which depends on claim 1, requires the claimed fusion polypeptide to comprise a linker between the first and second amino acid sequences. Claim 74, which depends on claim 73, requires the linker to have the $(Gly_xSer)_n$ formula, wherein n and x is an integer between 1-15 and 1-10, respectively. Claims 75 and 77, which depend on claim 1, requires the fusion polypeptide be bounded to a carbohydrate on said antigen bearing target. Claim 76, which depends on claim 1, requires the fusion polypeptide not be bounded to a carbohydrate on said antigen bearing target. Additionally, claim 77 limits the antigen bearing target to a cell.

Hoo teaches a composition comprising an antigen bearing target and a fusion polypeptide comprising a first and second amino acid sequence. [Claims 1-12, in particular.] The antigen bearing target that Hoo teaches includes a virus, a bacterial cell, fungal cell, a cell of a parasite, a mammalian cell, pathogenic and attenuated antigen bearing target, and a cell that is substantially unable to divide. [Lines 35-45,

column 10, and columns 9-18, in particular.] The fusion polypeptide that Hoo teaches is exogenous to an antigen bearing target that is a cell. Additionally, Hoo also teaches a cell comprising the nucleic acid sequence encoding the fusion polypeptide, thereby making the fusion polypeptide endogenous to the cell.

The first amino acid sequence in the fusion polypeptide of Hoo comprises the sequence to a heterologous membrane attachment domain. The second amino acid sequence in the fusion polypeptide of Hoo comprises the sequence of a ligand for a cell surface polypeptide that is a ligand for a cytokine receptor. Specifically, the ligand for a cell surface polypeptide present in the fusion polypeptide of Hoo is a ligand for a mouse GM-CSF receptor. [Example I, column 22, in particular.] The ligand for a cell surface polypeptide used by Hoo is a ligand for a mammalian, mouse, cell surface polypeptide; also known as a ligand for a cell surface polypeptide of a leukocyte, wherein the leukocyte is dendritic cells, which is a professional antigen presenting cell. [Columns 1-2, in particular.] Hoo teaches that the first amino acid sequence can be N-terminal and C-terminal to the second amino acid sequence. Hoo also teaches the use of the fusion polypeptide as an adjuvant in vaccine compositions

In the instant case, the heterologous membrane attachment domain (the first amino acid sequence) used by Hoo in his working embodiments does not include the amino acid sequence of a carbohydrate binding domain of C-type lectin. However, Hoo does suggest the use of the amino acid sequence of a carbohydrate binding domain of C-type lectin as a heterologous membrane attachment domain. [Table 2,

column 8, in particular.] The specific C-type lectin that Hoo teaches is selectin, a naturally occurring lectin.

Hence, it would have been prima facie obvious for one of ordinary skill in the art, at the time the invention was made, to have use the amino acid sequence of a naturally occurring lectin, selectin as the first amino acid sequence to the fusion polypeptide of Hoo. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to form an adjuvant that enhances the effectiveness of vaccine compositions. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the fusion polypeptides of Hoo has adjuvant properties.

Additionally, it is noted that claims 22-23, 31 and 33 require the mammalian cell surface polypeptide to human cell surface polypeptide, and the human cell surface polypeptide be a ligand for a human GM-CSF receptor. While it is noted that fusion polypeptides made by Hoo as part of his working embodiment comprises a ligand for a mouse GM-CSF receptor. However, it would have been prima facie obvious for one of ordinary skill in the art, at the time the invention was made, to use a ligand for a human GM-CSF receptor instead of a ligand for a mouse GM-CSF receptor. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to make an adjuvant that is specific for humans. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the use of equivalent alternatives is routinely practiced.

In addition, it should be noted that Hoo does not teach the binding of the fusion polypeptide to a carbohydrate of the antigen bearing target. Instead, Hoo teaches the unconjugation of the fusion polypeptide and antigen bearing target, and direct fusion of the antigen bearing target with the fusion polypeptide to form the composition. [Claims 1-12 and column 18, in particular.]

Additionally, with regard in claim 77, which limits the antigen bearing target to a cell, and requires the fusion polypeptide to be bounded to a carbohydrate on the cell, it should be noted that the requirement does not further limit the claim. Hence, the determination of patentability is not dependent on this requirement. In the instant case, the fusion polypeptide of Hoo comprises a membrane attachment domain, and the domain would obviously comprise the amino acid sequence of a selecting, which is a lectin, also known to bind to carbohydrates, would inherently bind to a carbohydrate domain present on the cell.

In addition, it is noted that the fusion polypeptide of Hoo does not comprise a linker.

However, at the time the invention was made, the use of linkers, including those having the $(Gly_xSer)_n$ formula, to influence the activities of fusion polypeptides is well known. Hence, it would have been prima facie obvious to one of ordinary skill in the art, at the time the invention was made to include a linker between the first and amino acid sequences. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to optimize the activity of the fusion polypeptide. One of ordinary skill in the art, at the time the invention was made,

would have had a reasonable expectation of success for doing so because optimization is routinely practiced in the art.

4. Claims 1, 10 and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoo, as applied to claim 1, in view of Parma et al. [2]

Claim 10, which depends on claim 1, requires the first amino acid sequence to bind to a sialic acid on a glycoprotein, wherein the sialic acid comprises at least one of the following carbohydrate structures: N-acetylneuraminic acid, alpha-NeuNAc-[2->6]-Gal, alpha-NeuNAc-[2->6]-GalNac and alpha-NeuNAc-[2->3]-Gal. Claim 12, which depends on claim 1, requires the first amino acid sequence to comprise at least 10 contiguous amino acids of a hemagglutinin, which is limited to an influenza virus hemagglutinin by claim 13, which is further limited to the HA1 domain of the influenza virus hemagglutinin by claim 14. Claim 15, which depends on claim 13, limits the influenza virus to influenza A virus, which is further limited to an H1 subtype by claim 17, which is further limited to the A/PR/8/34 strain by claim 18. Claim 116, which depends on claim 15, limits the influenza virus to a subtype that infects humans. Claim 19, which depends on claim 18, limits the influenza virus to subtype H2 or H3. Claim 20, which depends on claim 13, limits the influenza virus to a subtype that does not infect humans.

The significance of Hoo, as applied to claim 1, is discussed above. In the instant case, the heterologous membrane attachment domain (the first amino acid

[2] Parma et al. U.S. Patent No. 5780228, published July 14, 1998.

sequence) used by Hoo in his working embodiments does not include the amino acid sequence encompassed by claims 10 and 12-20. However, Hoo does suggest the use of any cell adhesion molecule as the heterologous membrane attachment domain.

At the time the invention was made, the use of the influenza hemagglutinin as a cell adhesion molecule is well known in the art, as demonstrated by Parma et al. [Paragraph bridging columns 1-2, in particular.] At the cited passage, Parma et al. discloses the use of the influenza hemagglutinin as a cell adhesion molecule. Thus, it would have been prima facie obvious for one of ordinary skill in the art, at the time the invention was made, to use influenza hemagglutinin as a heterologous membrane attachment domain. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so facilitate binding to a cell. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the substitution functional equivalents is routinely practiced in the art.

While it is noted that Parma et al. is not specific as to the subtype and strain of influenza the hemagglutinin should be derived, it should be noted that regardless of the source of hemagglutinin, the functional activities of these hemagglutinin, cell adhesion molecules, remain the same. Thus, it would have been prima facie obvious for one of ordinary skill in the art to use the hemagglutinin from all subtypes and strains of influenza viruses. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so facilitate binding to a cell. One of

ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the substitution functional equivalents is routinely practiced in the art.

Additionally, it should be noted that hemagglutinin is a naturally occurring lectin with an amino acid sequence that can bind to a carbohydrate on a glycoprotein, wherein the carbohydrate is sialic acid, including N-acetylneuraminic acid, alpha-NeuNAc-[2->6]-Gal, alpha-NeuNAc-[2->6]-GalNac or alpha-NeuNAc-[2->3]-Gal.

Conclusion

5. No claims are allowed.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emily Le whose telephone number is (571) 272 0903. The examiner can normally be reached on Monday - Friday, 8 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bruce R. Campell can be reached on (571) 272-0974. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Emily M. Le/
Patent Examiner
Art Unit 1648

/E.Le/